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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,370	03/30/2004	Kenichi Kawase	09792909-5860	4682

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EXAMINER	
LEE, CYNTHIA K	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/813,370	KAWASE ET AL.	
	Examiner	Art Unit	
	CYNTHIA LEE	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 December 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Response to Arguments

This Office Action is responsive to the amendment filed on 12/11/2009. Claims 1-27 are pending.

Applicant's arguments have been considered but are not persuasive. Claims 1-27 are finally rejected for reasons stated herein below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-22, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamura (US 2002/0168572) in view of Idota (US 6235427).

Tamura discloses a battery comprising an anode, a cathode and an electrolyte. The anode comprises a current collector, an active material layer and a surface coating layer.

[0010] The electrode for a rechargeable lithium battery has a current collector layer composed of a metal incapable of alloying with Li, a layer of active material provided on the current collector layer and composed of a metal capable of alloying with Li, and a surface coating layer provided on a surface of the active material layer, opposite to its surface carrying the current collector layer, and composed of a metal

incapable of alloying with Li or composed of an alloy of a metal incapable of alloying with Li and a metal capable of alloying with Li.

[0012] In the present invention, the metal capable of alloying with Li can be illustrated by a metal which can enter into a solid solution or intermetallic compound with Li. Examples of such metals include Sn (tin), Ge (germanium), Al (aluminum), In (indium), Mg (magnesium), Pb (lead), Bi (bismuth), Zn (zinc) and the like. The above-listed metals capable of alloying with Li may be contained in any combination. That is, the layer of active material may contain two or more of such metals capable of alloying with Li. It may contain an alloy of two or more of such metals capable of alloying with Li.

[0013] The metal incapable of alloying with Li can be illustrated by a metal which can not enter into a solid solution or intermetallic compound with Li, more specifically by a metal which does not show the presence of an alloy state in a binary phase diagram. Examples of metals incapable of alloying with Li include Cu (copper), Fe (iron), Ni (nickel), Co (cobalt), Mn (manganese), Ti (titanium), Zr (zirconium), Mo (molybdenum), W (tungsten), Ta (tantalum) and the like. Two or more of the above-listed metals incapable of alloying with Li may be contained.

[0014] In the present invention, the surface coating layer may be composed of either a metal incapable of alloying with Li or an alloy of a metal incapable of alloying with Li and a metal capable of alloying with Li. The metal capable of alloying with Li, contained in the alloy, may be identical or different in type from that constituting the layer of active material. For example, in the case where Sn constitutes the layer of

active material, the surface coating layer may be composed of an Sn alloy, a Ge alloy or an alloy of other metal capable of alloying with Li.

[0015] The metal incapable of alloying with Li, contained in the surface coating layer, may be identical or different in type from that constituting the current collector layer. For example, in the case where the current collector layer is composed of Cu, the surface coating layer may be composed of Cu, Fe or other metal incapable of alloying with Li.

[0016] The layer of active material is provided on the current collector layer. One method of providing the layer of active material on the current collector layer involves depositing a metal capable of alloying with Li on a substrate serving as the current collector layer to form the layer of active material thereon. For example, the layer of Sn active material can be formed by depositing Sn on a Cu substrate, such as a copper foil, which serves as the current collector layer. An alternative method involves depositing a metal incapable of alloying with Li on a substrate serving as the layer of active material to form the current collector layer thereon. For example, the Cu current collector layer can be formed by depositing Cu on an Sn substrate, such as a tin foil, which serves as the layer of active material. A plating, sputtering, vapor deposition or other technique can be utilized to form the active material layer or the current collector layer. Examples of vapor deposition techniques include CVD and vacuum vapor evaporation. Examples of plating techniques include electroplating and electroless plating.

[0017] In the present invention, a mixed phase in which a component of the surface coating layer is mixed with a component of the active material layer may be formed at an interface between the surface coating layer and the active material layer. Such a mixed phase can be formed, for example, by depositing the surface coating layer on the layer of active material and subjecting the resulting stack to a heat treatment. In the mixed phase, a component of the surface coating layer may enter into a solid solution or intermetallic compound with a component of the active material layer. The mixed phase may take a crystalline or amorphous form. Claims 4, 6, 8, 15 and 19 are met because the Specification describes that it is also possible that alloying arises when heat treatment is further provided (pg 9).

[0019] the thickness of the surface coating layer is preferably up to 0.2 um, more preferably up to 0.1 um. If the surface coating layer is excessively thick, a reaction between the active material layer and Li in an electrolyte may be inhibited to result in the reduced charge-discharge capacity. Preferably, the thickness of the surface coating layer is not below 0.01 um. Accordingly, the thickness of the surface coating layer is preferably in the approximate range of 0.01-0.2 um. If the surface coating layer is excessively thin, the effect of inhibiting the reaction between the active material layer and the electrolyte may be obtained in an insufficient manner. MPEP states that prior art which teaches a range overlapping or touching the claimed range anticipates if the prior art range discloses the claimed range with "sufficient specificity." See 2131.03.

Regarding the limitation "at an interface between aid active material layer and said current collector they are alloyed together," the Examiner asserts inherency. The

instant Specification pg. 8 states that "This active material layer 12 is preferably formed by at least one method from the group consisting of vapor-phase deposition method, liquid-phase deposition method, and sintering method. By using such methods, it is possible to inhibit destruction of the active material 12 due to its expansion and shrinkage according to charge and discharge. Further, the current collector 11 and the active material layer 12 can be integrated, and the electronic conductivity in the active material layer 12 can be improved" (emphasis added). The instant Specification pg. 9 states that "Specifically, it is preferable that on the interface between the active material layer 12 and the current collector 11, component elements of the current collector 11 are diffused in the active material layer 12, or component elements of the active material are diffused in the current collector 11, or both of them are diffused each other. This allying often arises simultaneously with formation of the active material layer 12 by vapor-phase deposition method, liquid-phase deposition method, or sintering method. It is also possible that this alloying arises when heat treatment is further provided" (emphasis added). Tamura state that for example, the Cu current collector layer can be formed by depositing Cu on an Sn substrate, such as a tin foil, which serves as the layer of active material. A plating, sputtering, vapor deposition or other technique can be utilized to form the active material layer or the current collector layer. Examples of vapor deposition techniques include CVD and vacuum vapor evaporation. Examples of plating techniques include electroplating and electroless plating [0016].

Tamura discloses a thin film layer, but does not disclose several layers, wherein the other layers not in contact with the active material layer is made of different material than that of the layer in contact with the active material layer (Applicant's claim 1). Idota teaches a negative electrode comprising silicon, silicon alloy or silicic material and is coated with plurality of materials (2:40). The material is coated with metal for further improving discharge capacity and cycle life (5:40-42). The metal coating is not limited as long as it has high electrical conductivity, Ni, Cu, Ag, Co, Fe, Cr, W, Ti, Pt, Pd, Sn, and Zn (6:10-15). Idota teaches that a protective film can be applied to the negative active material. In cases where lithium is to be intercalated into the negative electrode material in an assembled battery, it is preferred for the negative electrode to have a protective layer. The protective layer has a single layer or more than one layer, either the same or different (12:30-50). The "different layers" of Idota reads on Applicant's "several layers" and "made of one or metal materials different than that of the layer in contact with the active material layer" of claim 1. It would have been obvious to one of ordinary skill in the art at the time the invention was made to coat the negative electrode of Tamura with a metal coatings, as taught by Idota, for the benefit of increasing the discharge capacity and cycle life.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamura (US 2002/0168572) in view of Idota (US 6235427) as applied to claim 13 and applied herein, and in view of Morishima (US 2003/0054253).

Tamura discloses a positive material, but does not disclose that the material contains a lithium containing metal complex oxide. However, Morishima teaches a lithium containing metal complex oxide as described in equation 1. Morishima teaches that the material is capable of obtaining a large discharge capacity and good discharge rate characteristics [0008]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the material as specified by Morishima as the positive active material for the benefit of achieving large discharge capacity and good discharge rate characteristics.

Tamura discloses an electrolyte, but does not disclose a holding body. However, Morishima teaches a polymer gel-like non-aqueous electrolyte in which a nonaqueous solvent and a solute are supported by a polymer material [0096]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a gel-like electrolyte in Tamura's battery for the benefit of preventing leakage of the nonaqueous electrolyte.

Tamura discloses a battery, but does not disclose film exterior members. However, Morishima teaches of laminating (applicant's film) a structure comprising a positive electrode, a negative electrode, and a separator by applying a thermal pressing to the wound laminate structure [0107]. It would have been obvious to one of ordinary

skill in the art at the time the invention was made to laminate the electrode assembly for the benefit of forming close electrical contact between the electrodes.

Response to Arguments

Applicant's arguments filed 12/11/2009 have been fully considered but they are not persuasive.

Applicant argues that Idota fails to disclose anything pertaining to a thin film layer having several layers with the layer in contact with the active material layer being made of a metal material which alloys with silicon or germanium and the other layers being made of one or more metal material different than that of the layer in contact with the active material layer. Idota merely discloses a battery containing a silicic material which is coated with a metal.

In response, Idota teaches that a protective film can be applied to the negative active materialThe protective layer has a single layer or more than one layer, either the same or different (12:30-50). The "different layers" of Idota reads on Applicant's "several layers" and "made of one or metal materials different than that of the layer in contact with the active material layer" of claim 1.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Lee whose telephone number is 571-272-8699. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's trainer, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Cynthia Lee/
Examiner, Art Unit 1795

/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1795